

## **The Claims**

Claims 1-21. (Canceled).

22. (Previously presented) A method as recited in claim 24, wherein digitally signing the delegation certificate comprises having the delegation certificate digitally signed by a plurality of computers.

23. (Previously presented) A method as recited in claim 24, wherein the group of computers comprise a Byzantine-fault-tolerant group.

24. (Previously presented) A method comprising:  
identifying a group of computers to which a subtree of a hierarchical namespace used to store files is to be delegated;  
generating a delegation certificate for the subtree, wherein the delegation certificate comprises:

a first digitally signed certificate identifying another group of computers responsible for managing a namespace root of the subtree; and

a second digitally signed certificate allowing authorization of the group of computers to manage the subtree to be traced to the other group of computers responsible for managing the namespace root;

digitally signing the delegation certificate; and

issuing the delegation certificate to the group of computers.

25. (Original) A method as recited in 24, wherein the second digitally signed certificate comprises:

an identification of a path below the beginning of another subtree previously delegated to a third group of computers, wherein the third group of computers are the directory group performing generating;

an identification of a root of the other subtree delegated to the third group of computers;

an identification of the subtree; and

an identification of the members of the group of computers.

26. (Original) A method as recited in claim 25, wherein the computers in the third group of computers are the same computers as in the other group of computers.

27. (Original) A method as recited in 24, wherein the first digitally signed certificate is digitally signed by a certification authority (CA).

28. (Original) A method as recited in 24, wherein the delegation certificate further comprises one or more additional digitally signed certificates allowing a certificate chain to be established from the second digitally signed certificate to the first digitally signed certificate.

Claims 29-55. (Canceled).

56. (Original) A serverless distributed file system comprising:

a plurality of computers;

a first set of the plurality of computers operating to store directory information for the file system, wherein each computer of the first set is part of a Byzantine-fault-tolerant group;

a second set of the plurality of computers operating to store replicas of the files in the file system, wherein for each file stored in the file system a plurality of replicas of the file are stored on the second set of computers, and wherein fewer computers are in the first set than in the second set;

wherein the first set of computers is configured to delegate management responsibility for a group of directories of the file system to a third set of the plurality of computers by,

generating a delegation certificate for the group of directories,

digitally signing the delegation certificate, and

issuing the delegation certificate to the third set of computers; and

wherein the third set of computers is configured to maintain management responsibility for the group of directories by employing a plurality of locks to control access to objects in each directory of the group, wherein the plurality of locks include,

a first set of locks to control opening of the objects, and

a second set of locks to control access to the data in the objects.

57. (Previously presented) One or more computer readable media having stored thereon a plurality of instructions that, when executed by one or more processors, causes the one or more processors to perform acts comprising:

identifying a group of computers to which a subtree of a hierarchical namespace used to store files is to be delegated;

generating a delegation certificate for the subtree, wherein the delegation certificate comprises:

a first digitally signed certificate identifying another group of computers responsible for managing a namespace root of the subtree; and

a second digitally signed certificate allowing authorization of the group of computers to manage the subtree to be traced to the other group of computers responsible for managing the namespace root;

digitally signing the delegation certificate; and

issuing the delegation certificate to the group of computers.

58. (Previously presented) One or more computer readable media as recited in claim 57, wherein digitally signing the delegation certificate comprises having the delegation certificate digitally signed by a plurality of computers.

59. (Previously presented) One or more computer readable media as recited in claim 57, wherein the group of computers comprise a Byzantine-fault-tolerant group.

60. (Previously presented) One or more computer readable media as recited in 57, wherein the second digitally signed certificate comprises:

an identification of a path below the beginning of another subtree previously delegated to a third group of computers, wherein the third group of computers are the directory group performing generating;

an identification of a root of the other subtree delegated to the third group of computers;

an identification of the subtree; and

an identification of the members of the group of computers.

61. (Previously presented) One or more computer readable media as recited in claim 60, wherein the computers in the third group of computers are the same computers as in the other group of computers.

62. (Previously presented) One or more computer readable media as recited in 57, wherein the first digitally signed certificate is digitally signed by a certification authority (CA).

63. (Previously presented) One or more computer readable media as recited in 57, wherein the delegation certificate further comprises one or more additional digitally signed certificates allowing a certificate chain to be established from the second digitally signed certificate to the first digitally signed certificate.

64. (Previously presented) A computer comprising:

a processor;

a memory coupled to the processor; and

wherein the memory is to store a plurality of instructions to:

- identify a group of computers to which a subtree of a hierarchical namespace used to store files is to be delegated;
- generate a delegation certificate for the subtree, wherein the delegation certificate comprises:
  - a first digitally signed certificate identifying another group of computers responsible for managing a namespace root of the subtree; and
  - a second digitally signed certificate allowing authorization of the group of computers to manage the subtree to be traced to the other group of computers responsible for managing the namespace root;
- digitally sign the delegation certificate; and
- issue the delegation certificate to the group of computers.

65. (Previously presented) A computer as recited in claim 64, wherein to digitally sign the delegation certificate is to have the delegation certificate digitally signed by a plurality of computers.

66. (Previously presented) A computer as recited in claim 64, wherein the group of computers comprise a Byzantine-fault-tolerant group.

67. (Previously presented) A computer as recited in 64, wherein the second digitally signed certificate comprises:

an identification of a path below the beginning of another subtree previously delegated to a third group of computers, wherein the third group of computers are the directory group performing generating;

an identification of a root of the other subtree delegated to the third group of computers;

an identification of the subtree; and

an identification of the members of the group of computers.

68. (Previously presented) A computer as recited in claim 67, wherein the computers in the third group of computers are the same computers as in the other group of computers.

69. (Previously presented) A computer as recited in 64, wherein the first digitally signed certificate is digitally signed by a certification authority (CA).

70. (Previously presented) A computer as recited in 64, wherein the delegation certificate further comprises one or more additional digitally signed certificates allowing a certificate chain to be established from the second digitally signed certificate to the first digitally signed certificate.